WHAT IS CLAIMED IS:

1.   An apparatus for alerting a pilot of a rotary wing aircraft of proximity to terrain, the apparatus comprising:

      an input for receiving signals representative of a position of the aircraft, a flight path angle of the aircraft and a speed of the aircraft, and coupled to a database of stored terrain information;

      an output;

      a signal processing device, coupled to said input, and coupled to said output, for:

      (a) defining a look ahead distance;

      (b) defining a first alert envelope, indicative of a first severity of terrain threat, wherein boundaries of said first alert envelope are determined as a first function of the flight path angle, said look ahead distance, and a terrain floor boundary; wherein said terrain floor boundary comprises a function of an aircraft altitude and said speed;

      (c) defining a second alert envelope, indicative of a second severity of terrain threat, wherein boundaries of said second alert envelope are determined as a second function of the flight path angle, said look ahead distance and said terrain floor boundary; and

      (d) outputting an alert signal when a subset of the stored terrain information is located within the boundaries of at least one of said first and said second alert envelopes.

2.   The apparatus of claim 1 wherein at least one of said first and second alert envelopes is further bounded by a cut-off envelope.

3.   The apparatus of claim 1 wherein said signals representative of the position of an aircraft include a first signal received from a satellite navigation system indicative of the aircraft altitude and a second signal representative of the aircraft altitude received from a source other than the satellite navigation system, and wherein said signal processing device further comprises a means for determining a compound altitude signal.

4.   The apparatus of claim 1 wherein the boundaries of at least one of said first and second alert envelopes is further determined as a function of a configurable datum.

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1   5.   The apparatus of claim 1 wherein at least one of said first and second
2   alert envelopes further comprises a subset of alert envelopes representing various severities of
3   hazard to the aircraft.

1   6.   The apparatus of claim 1 wherein said signal processing device
2   comprises a microprocessor.

1   7.   The apparatus of claim 1 wherein said signal processing device
2   comprises a means for outputting said alert signal as a video control signal, wherein said
3   video control signal is useful for controlling representation of terrain on a video display in
4   various colors according to a degree of terrain threat.

1   8.   The apparatus of claim 1 further comprising a voice warning generator
2   coupled to said signal processor and wherein said alert signal output from said signal
3   processing device comprises an audio control signal to command said voice warning
4   generator to output an aural alert.

1   9.   The apparatus of claim 1 wherein said speed comprises a groundspeed
2   of the aircraft.

1   10.   The apparatus of claim 1 wherein the aircraft is a tilt rotor.

1   11.   The apparatus of claim 1 wherein said signal processing device further
2   comprises a means for outputting a video control signal to control representation of a
3   background terrain data proximate the aircraft:
4   in a first color for terrain located more than a predetermined amount relative to
5   a current altitude of the aircraft wherein said predetermined amount is a first value for a
6   cruise phase of flight and a second value for an approach phase of flight and a third value for
7   a landing phase of flight; and
8   in a second color for terrain located less than said predetermined amount
9   relative to said current altitude.

1   12.   The apparatus of claim 11 wherein said cruise, approach and landing
2   phases are defined as a function of said speed of the aircraft.

1   13.   The apparatus of claim 1 wherein said look ahead distance is a function

2 of a distance to transition from a first phase of flight to a hover phase of flight.

1   14.   A method for alerting a pilot of a rotary wing aircraft of proximity to

2 terrain comprising the steps of:

3   accessing a database of terrain information;

4   receiving signals representative of a position of the aircraft, a flight path angle

5 of the aircraft and a speed of the aircraft;

6   defining a look ahead distance;

7   defining a first alert envelope, indicative of a first severity of terrain threat,

8 wherein boundaries of said first alert envelope are determined as a first function of the flight

9 path angle, said look ahead distance, and a terrain floor boundary;

10   defining a second alert envelope, indicative of a second severity of terrain

11 threat, wherein boundaries of said second alert envelope are determined as a second function

12 of the flight path angle, said look ahead distance and said terrain floor boundary;

13   defining said terrain floor boundary as a function of an aircraft altitude and

14 said speed; and

15   outputting an alert signal when a subset of the stored terrain information is

16 located within the boundaries of at least one of said first and said second alert envelopes.

1   15.   The method of claim 14 wherein said step of outputting an alert signal

2 further comprises the step of outputting a video control signal to control display of terrain on

3 a display device.

1   16.   The method of claim 14 further comprising the step of defining a cut-

2 off envelope to form a boundary of at least one of said first and second alert envelopes.

1   17.   The method of claim 14 further comprising the step of receiving a first

2 and a second altitude signal from a distinct first and second sources respectively to obtain a

3 compound altitude signal representative of the aircraft altitude.

1   18.   The method of claim 14 wherein said step of outputting an alert signal

2 comprises outputting an audio control signal to generate an aural alert.

1   19.   The method of claim 14 further comprising the step of outputting a

2   video control signal to control representation of terrain in a first color for terrain located more

3   than a predefined amount relative to current altitude of the aircraft and in a second color for

4   terrain located less than said predefined amount relative to said current altitude wherein said

5   predefined amount is a first value for a cruise phase of flight, a second value for an approach

6   phase of flight, and a third value for a landing phase of flight.

1   20.   A computer program product for alerting a pilot of a rotary wing

2   aircraft of proximity to terrain comprising:

3   a computer readable storage medium having computer readable program code

4   means embodied in said medium, said computer readable program code means comprising:

5   a first computer instruction means for accessing a database of terrain

6   information;

7   a second computer instruction means for accessing signals representative of a

8   position of the aircraft, a flight path angle of the aircraft and a speed of the aircraft;

9   a third computer instruction means for defining a look ahead distance;

10   a fourth computer instruction means for defining a first alert envelope,

11   indicative of a first severity of terrain threat, wherein boundaries of said first alert envelope

12   are determined as a first function of the flight path angle, said look ahead distance, and a

13   terrain floor boundary;

14   a fifth computer instruction means for defining a second alert envelope,

15   indicative of a second severity of terrain threat, wherein boundaries of said second alert

16   envelope are determined as a second function of the flight path angle, said look ahead

17   distance and said terrain floor boundary;

18   a sixth computer instruction means for defining said terrain floor boundary as

19   a function of an aircraft altitude and a said speed; and

20   a seventh computer instruction means for outputting an alert signal when a

21   subset of the stored terrain information is located within the boundaries of at least one of said

22   first and said second alert envelopes.

1   21.   The computer program product of claim 20 further comprising an

2   eighth computer instruction means for outputting a video control signal to control display of

3   terrain on a display device.

1   22.   The computer program product of claim 20 further comprising an

2   eighth computer instruction means for defining a cut-off envelope to form a boundary of at

3   least one of said first and second alert envelopes.

1   23.   The computer program product of claim 20 further comprising an

2   eighth computer instruction means for accessing a first and a second altitude signal from a

3   distinct first and second sources respectively to obtain a compound altitude signal

4   representative of the aircraft altitude.

1   24.   The computer program product of claim 20 wherein said seventh

2   computer instruction means further comprises a means for outputting an audio control signal

3   to generate an aural alert.

1   25.   The computer program product of claim 20 further comprising an

2   eighth computer instruction means for outputting a video control signal to control

3   representation of terrain in a first color for terrain located more than a predefined amount

4   relative to a current altitude of the aircraft and in a second color for terrain located less than

5   said predefined amount relative to said current altitude wherein said predefined amount is a

6   first value for a cruise phase of flight, a second value for an approach phase of flight, and a

7   third value for a landing phase of flight.

1   26.   An apparatus for alerting a pilot of a hover-capable aircraft of

2   proximity to terrain, the apparatus comprising:

3   an input for receiving signals representative of a position of the aircraft, a

4   flight path angle of the aircraft and a speed of the aircraft, and coupled to a database of stored

5   terrain information;

6   an output;

7   a signal processing device, coupled to said input, and coupled to said output,

8   for:

9   (a) defining a look ahead distance as a function of a distance to transition from

10   a first phase of flight to a hover phase of flight;

11   (b) defining a first alert envelope, indicative of a first severity of terrain threat,

12   wherein boundaries of said first alert envelope are determined as a first function of the

13   flight path angle, said look ahead distance, and a terrain floor boundary;

14   (c) defining a second alert envelope, indicative of a second severity of terrain

15   threat, wherein boundaries of said second alert envelope are determined as a second

16   function of the flight path angle, said look ahead distance and said terrain floor

17   boundary; and

18   (d) outputting an alert signal when a subset of the stored terrain information is

19   located within the boundaries of at least one of said first and said second alert

20   envelopes.

1   27.   The apparatus of claim 26 wherein at least one of said first and second

2 alert envelopes is further bounded by a cut-off envelope.

1   28.   The apparatus of claim 26 wherein said signals representative of the

2 position of an aircraft include a first signal received from a satellite navigation system

3 indicative of an aircraft altitude and a second signal representative of the aircraft altitude

4 received from a source other than the satellite navigation system, and wherein said signal

5 processing device further comprises a means for determining a compound altitude signal.

1   29.   The apparatus of claim 26 wherein the boundaries of at least one of

2 said first and second alert envelopes is further determined as a function of a configurable

3 datum.

1   30.   The apparatus of claim 26 wherein at least one of said first and second

2 alert envelopes further comprises a subset of alert envelopes representing various severities of

3 hazard to the aircraft.

1   31.   The apparatus of claim 26 wherein said signal processing device

2 comprises a microprocessor.

1   32.   The apparatus of claim 26 wherein said signal processing device

2 comprises a means for outputting said alert signal as a video control signal, wherein said

3 video control signal is useful for controlling representation of terrain on a video display in

4 various colors according to a degree of terrain threat.

1   33.   The apparatus of claim 26 further comprising a voice warning

2 generator coupled to said signal processor and wherein said alert signal output from said

3 signal processing device comprises an audio control signal to command said voice warning
4 generator to output an aural alert.

1   34.   The apparatus of claim 26 wherein said speed comprises a
2 groundspeed of the aircraft.

1   35.   The apparatus of claim 26 wherein the aircraft is an airship.

1   36.   The apparatus of claim 26 wherein the aircraft is a tilt rotor.

1   37.   The apparatus of claim 26 wherein said signal processing device
2 further comprises a means for outputting a video control signal to control representation of a
3 background terrain data proximate the aircraft:
4   in a first color for terrain located more than a predetermined amount relative to
5 a current altitude of the aircraft wherein said predetermined amount is a first value for a
6 cruise phase of flight and a second value for an approach phase of flight and a third value for
7 a landing phase of flight; and
8   in a second color for terrain located less than said predetermined amount
9 relative to said current altitude.

1   38.   The apparatus of claim 26 wherein said cruise, approach and landing
2 phases are defined as a function of said speed of the aircraft.

1   39.   A method for alerting a pilot of a hover-capable aircraft of proximity to
2 terrain comprising the steps of:
3   accessing a database of terrain information;
4   receiving signals representative of a position of the aircraft, a flight path angle
5 of the aircraft and a speed of the aircraft;
6   defining a look ahead distance as a function of a distance to transition from a
7 first phase of flight to a hover phase of flight;
8   defining a first alert envelope, indicative of a first severity of terrain threat,
9 wherein boundaries of said first alert envelope are determined as a first function of the flight
10 path angle, said look ahead distance, and a terrain floor boundary;
11   defining a second alert envelope, indicative of a second severity of terrain
12 threat, wherein boundaries of said second alert envelope are determined as a second function
13 of the flight path angle, said look ahead distance and said terrain floor boundary; and

14   outputting an alert signal when a subset of the stored terrain information is

15 located within the boundaries of at least one of said first and said second alert envelopes.

1   40. The method of claim 39 wherein said step of outputting an alert signal

2 further comprises the step of outputting a video control signal to control display of terrain on

3 a display device.

1   41. The method of claim 39 further comprising the step of defining a cut-

2 off envelope to form a boundary of at least one of said first and second alert envelopes.

1   42. The method of claim 39 further comprising the step of receiving a first

2 and a second altitude signal from a distinct first and second sources respectively to obtain a

3 compound altitude signal representative of the aircraft altitude.

1   43. The method of claim 39 wherein said step of outputting an alert signal

2 comprises outputting an audio control signal to generate an aural alert.

1   44. The method of claim 39 further comprising the step of outputting a

2 video control signal to control representation of terrain in a first color for terrain located more

3 than a predefined amount relative to a current altitude of the aircraft and in a second color for

4 terrain located less than said predefined amount relative to said current altitude wherein said

5 predefined amount is a first value for a cruise phase of flight, a second value for an approach

6 phase of flight, and a third value for a landing phase of flight.

1   45. A computer program product for alerting a pilot of a hover-capable

2 aircraft of proximity to terrain comprising:

3   a computer readable storage medium having computer readable program code

4 means embodied in said medium, said computer readable program code means comprising:

5   a first computer instruction means for accessing a database of terrain

6 information;

7   a second computer instruction means for accessing signals representative of a

8 position of the aircraft, a flight path angle of the aircraft and a speed of the aircraft;

9   a third computer instruction means for defining a look ahead distance as a

10 function of a distance to transition from a first phase of flight to a hover phase of flight;

11   a fourth computer instruction means for defining a first alert envelope,

12 indicative of a first severity of terrain threat, wherein boundaries of said first alert envelope

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13   are determined as a first function of the flight path angle, said look ahead distance, and a

14   terrain floor boundary;

15   a fifth computer instruction means for defining a second alert envelope,

16   indicative of a second severity of terrain threat, wherein boundaries of said second alert

17   envelope are determined as a second function of the flight path angle, said look ahead

18   distance and said terrain floor boundary; and

19   a sixth computer instruction means for outputting an alert signal when a subset

20   of the stored terrain information is located within the boundaries of at least one of said first

21   and said second alert envelopes.

1   46.   The computer program product of claim 45 further comprising a

2   seventh computer instruction means for outputting a video control signal to control display of

3   terrain on a display device.

1   47.   The computer program product of claim 45 further comprising a

2   seventh computer instruction means for defining a cut-off envelope to form a boundary of at

3   least one of said first and second alert envelopes.

1   48.   The computer program product of claim 45 further comprising a

2   seventh computer instruction means for accessing a first and a second altitude signal from a

3   distinct first and second sources respectively to obtain a compound altitude signal

4   representative of the aircraft altitude.

1   49.   The computer program product of claim 45 wherein said sixth

2   computer instruction means further comprises a means for outputting an audio control signal

3   to generate an aural alert.

1   50.   The computer program product of claim 45 further comprising a

2   seventh computer instruction means for outputting a video control signal to control

3   representation of terrain in a first color for terrain located more than a predefined amount

4   relative to a current altitude of the aircraft and in a second color for terrain located less than

5   said predefined amount relative to said current altitude wherein said predefined amount is a

6   first value for a cruise phase of flight, a second value for an approach phase of flight, and a

7   third value for a landing phase of flight.

1   51.   An apparatus for alerting a pilot of a rotary wing aircraft of proximity

2   to terrain comprising:

3   an input for receiving signals representative of a position of the

4   aircraft, a flight path angle of the aircraft and a speed of the aircraft, and coupled to a

5   database of stored terrain information;

6   an output; and

7   a signal processor, coupled to said input and to said output for:

8   (a) defining a look ahead/look down alert envelope, wherein

9   boundaries of said alert envelope are determined as a function of the flight path angle,

10   a look ahead distance, and a terrain floor boundary; wherein said terrain floor

11   boundary comprises a function of an aircraft altitude and said speed, and wherein said

12   look ahead distance comprises a function of a distance to transition from a first phase

13   of flight to a hover phase of flight; and

14   (b) outputting an alert signal when a subset of the stored terrain

15   information is located within the boundaries of said alert envelope.

1   52.   The apparatus of claim 51 wherein said look ahead/look down alert

2   envelope further comprises a first, caution, envelope and a second, warning, envelope.

1   53.   The apparatus of claim 52 wherein said signal processor outputs a first

2   alert signal when said subset of the stored terrain information is located within the boundaries

3   of said caution envelope and a second alert signal when said subset of the stored terrain

4   information is located within the boundaries of said warning envelope.

1   54.   The apparatus of claim 51 wherein said signal processor comprises a

2   microprocessor.

1   55.   The apparatus of claim 51 wherein said speed comprises a

2   groundspeed of the aircraft.

1   56.   The apparatus of claim 51 wherein said signal processing device

2   comprises a means for outputting said alert signal as a video control signal, wherein said

3   video control signal is useful for controlling representation of terrain on a video display in

4   various colors according to a degree of terrain threat.

1   57.   The apparatus of claim 51 further comprising a voice warning
2   generator coupled to said signal processor and wherein said alert signal output from said
3   signal processing device comprises an audio control signal to command said voice warning
4   generator to output an aural alert.

1   58.   The apparatus of claim 51 wherein said signal processing device
2   further comprises a means for outputting a video control signal to control representation of a
3   background terrain data proximate the aircraft:
4   in a first color for terrain located more than a predetermined amount relative to
5   a current altitude of the aircraft wherein said predetermined amount is a first value for a
6   cruise phase of flight and a second value for an approach phase of flight and a third value for
7   a landing phase of flight; and
8   in a second color for terrain located less than said predetermined amount
9   relative to said current altitude.

1   59.   The apparatus of claim 58 wherein said cruise, approach and landing
2   phases are defined as a function of said speed of the aircraft.

1   60.   The apparatus of claim 51 wherein said signal processor further defines
2   a look up envelope and outputs said alert signal when said subset of terrain is located within
3   said look up envelope.

1   61.   A method for alerting a pilot of a rotary wing aircraft of proximity to
2   terrain comprising the steps of:
3   receiving signals representative of a position of the aircraft, a flight path angle
4   of the aircraft and a speed of the aircraft, and stored terrain information;
5   defining a look ahead/look down alert envelope, wherein boundaries of said
6   alert envelope are determined as a function of the flight path angle, a look ahead distance, and
7   a terrain floor boundary; wherein said terrain floor boundary comprises a function of an
8   aircraft altitude and a said speed, and wherein said look ahead distance comprises a function
9   of a distance to transition from a first phase of flight to a hover phase of flight; and
10   outputting an alert signal when a subset of the stored terrain information is
11   located within said alert envelope.

1   62.   The method of claim 61 wherein said look ahead/look down alert

2   envelope further comprises a first caution envelope and a second warning envelope.

1   63.   The method of claim 62 further comprising the steps of outputting a

2   first alert signal when said subset of the stored terrain information is located within the

3   boundaries of said caution envelope and outputting a second alert signal when said subset of

4   the stored terrain information is located within the boundaries of said warning envelope.

1   64.   The method of claim 61 further comprising the step of outputting a

2   video control signal, wherein said video control signal is useful for controlling representation

3   of terrain on a video display in various colors according to a degree of terrain threat.

1   65.   The method of claim 61 further comprising the step of outputting an

2   aural alert.

1   66.   The method of claim 61 further comprising the step of outputting a

2   video control signal to control representation on a display of a background terrain data

3   proximate the aircraft:

4   in a first color for terrain located more than a predetermined amount relative to

5   a current altitude of the aircraft wherein said predetermined amount is a first value for a

6   cruise phase of flight and a second value for an approach phase of flight and a third value for

7   a landing phase of flight; and

8   in a second color for terrain located less than said predetermined amount

9   relative to said current altitude.

1   67.   The method of claim 66 further comprising the step of defining said

2   cruise, approach and landing phases as a function of said speed of the aircraft.

1   68.   The method of claim 61 further comprising the step of defining a look

2   up envelope and outputting said alert signal when said subset of terrain is located within said

3   look up envelope.

1   69.   A computer program product for alerting a pilot of a rotary wing

2   aircraft of proximity to terrain comprising:

3   a computer readable storage medium having computer readable program code

4   means embodied in said medium, said computer readable program code means comprising:

5   a first computer instruction means for accessing signals representative of a

6 position of the aircraft, a flight path angle of the aircraft and a speed of the aircraft, and stored

7 terrain information;

8   a second computer instruction means for defining a look ahead/look down

9 alert envelope, wherein boundaries of said alert envelope are determined as a function of the

10 flight path angle, a look ahead distance, and a terrain floor boundary; wherein said terrain

11 floor boundary comprises a function of an aircraft altitude and said speed, and wherein said

12 look ahead distance comprises a function of a distance to transition from a first phase of flight

13 to a hover phase of flight; and

14   a third computer instruction means for outputting an alert signal when a subset

15 of the stored terrain information is located within said alert envelope.

1   70. The computer program product of claim 69 wherein said second

2 computer instruction means further defines said look ahead/look down alert envelope as

3 comprising a first caution envelope and a second warning envelope.

1   71. The computer program product of claim 70 further comprising a fourth

2 computer instruction means for outputting a first alert signal when said subset of the stored

3 terrain information is located within the boundaries of said caution envelope and outputting a

4 second alert signal when said subset of the stored terrain information is located within the

5 boundaries of said warning envelope.

1   72. The computer program product of claim 69 further comprising a fourth

2 computer instruction means for outputting a video control signal, wherein said video control

3 signal is useful for controlling representation of terrain on a video display in various colors

4 according to a degree of terrain threat.

1   73. The computer program product of claim 69 further comprising a fourth

2 computer instruction means for outputting an aural alert.

1   74. The computer program product of claim 69 further comprising a fourth

2 computer instruction means for outputting a video control signal to control representation on

3 a display of a background terrain data proximate the aircraft:

4   in a first color for terrain located more than a predetermined amount relative to

5 a current altitude of the aircraft wherein said predetermined amount is a first value for a

6   cruise phase of flight and a second value for an approach phase of flight and a third value for

7   a landing phase of flight; and

8   in a second color for terrain located less than said predetermined amount

9   relative to said current altitude.

1   75.   The computer program product of claim 74 further comprising a fifth

2   computer instruction means for defining said cruise, approach and landing phases as a

3   function of said speed of the aircraft.

1   76.   The computer program product of claim 69 further comprising a fourth

2   computer instruction means for defining a look up envelope and wherein said third computer

3   instruction means outputs said alert signal when said subset of terrain is located within said

4   look up envelope.

1   77.   A ground proximity warning system for rotary wing aircraft

2   comprising:

3   a warning computer including:

4   (a) an input for receiving signals representative of a position of the aircraft, a

5   flight path angle of the aircraft and a speed of the aircraft, and coupled to a database

6   of stored terrain information;

7   (b) an output; and

8   (c) a signal processor, coupled to said input and to said output for:

9   (i) defining an alert envelope, wherein boundaries of said alert envelope

10   are determined as a function of the flight path angle, a look ahead distance,

11   and a terrain floor boundary; wherein said terrain floor boundary comprises a

12   function of an aircraft altitude and said speed, and wherein said look ahead

13   distance comprises a function of a distance to transition from a first phase of

14   flight to a hover phase of flight; and

15   (ii) outputting an alert signal when a subset of the stored terrain

16   information is located within the boundaries of said alert envelope; and

17   a display, having an display input coupled to said output of said warning

18   computer, for displaying said terrain data proximate the aircraft in various colors

19   according to a degree of terrain threat.

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1   78.   The system of claim 77 wherein said warning computer comprises a

2 general purpose processor.

1   79.   The system of claim 77 wherein said speed comprises a groundspeed

2 of the aircraft.

1   80.   The system of claim 77 wherein the aircraft is a tilt rotor.

1   81.   A ground proximity warning system for rotary wing aircraft

2 comprising:

3   a warning computer including:

4   (a) an input for receiving signals representative of a position of the aircraft, a

5 flight path angle of the aircraft and a speed of the aircraft, and coupled to a database

6 of stored terrain information;

7   (b) an output; and

8   (c) a signal processor, coupled to said input and to said output for:

9   (i) defining an alert envelope, wherein boundaries of said alert envelope

10 are determined as a function of the flight path angle, a look ahead distance,

11 and a terrain floor boundary; wherein said terrain floor boundary comprises a

12 function of an aircraft altitude and said speed, and wherein said look ahead

13 distance comprises a function of a distance to transition from a first phase of

14 flight to a hover phase of flight; and

15   (ii) outputting an alert signal when a subset of the stored terrain

16 information is located within the boundaries of said alert envelope; and

17 a display, having an display input coupled to said output of said warning

18 computer, for:

19   (a) displaying said terrain data located in the boundaries of said alert envelope

20 in various colors according to a degree of terrain threat; and

21   (b) displaying terrain data proximate the aircraft:

22   (i) in a first color for terrain located more than a predetermined amount

23 relative to a current altitude of the aircraft wherein said predetermined amount

24 is a first value for a cruise phase of flight and a second value for an approach

25 phase of flight and a third value for a landing phase of flight; and

26   (ii) in a second color for terrain located less than said predetermined

27   amount relative to said current altitude.

1   82.   The system of claim 77 wherein the aircraft is a tilt rotor.

1   83.   The method of claim 14 wherein said speed comprises a groundspeed

2   of the aircraft.

1   84.   The computer program product of claim 20 wherein said speed

2   comprises a groundspeed of the aircraft.

1   85.   The method of claim 39 wherein said speed comprises a groundspeed

2   of the aircraft.

1   86.   The computer program product of claim 45 wherein said speed

2   comprises a groundspeed of the aircraft.

1   87.   The method of claim 61 wherein said speed comprises a groundspeed

2   of the aircraft.

1   88.   The computer program product of claim 69 wherein said speed

2   comprises a groundspeed of the aircraft.

1   89.   The method of claim 1 wherein said look ahead distance comprises a

2   function of a distance to a nearest runway.